

Product Data Sheet 638/2HHPU

ebmpapst

The engineer's choice



638/2HHPU

INDEX

| | | |
|----------|-------------------------------------|-----------|
| 1 | General | 3 |
| 2 | Mechanics | 3 |
| 2.1 | General | 3 |
| 2.2 | Connections | 3 |
| 3 | Operating Data | 4 |
| 3.1 | Electrical Interface - Input | 4 |
| 3.2 | Electrical Operating Data | 5 |
| 3.3 | Electrical Interface - Output | 6 |
| 3.4 | Electrical Features | 6 |
| 3.5 | Aerodynamics | 15 |
| 3.6 | Sound Data | 17 |
| 4 | Environment | 17 |
| 4.1 | General | 17 |
| 4.2 | Climatic Requirements | 17 |
| 5 | Safety | 18 |
| 5.1 | Electrical Safety | 18 |
| 5.2 | Approval Tests | 18 |
| 6 | Reliability | 18 |
| 6.1 | General | 18 |



1 General

| | | |
|-------------------------------------|-------------------------|--|
| Fan type | Fan | |
| Rotating direction looking at rotor | Clockwise | |
| Airflow direction | Air outlet over struts | |
| Bearing system | Stainless steel bearing | |
| Mounting position - shaft | Any | |

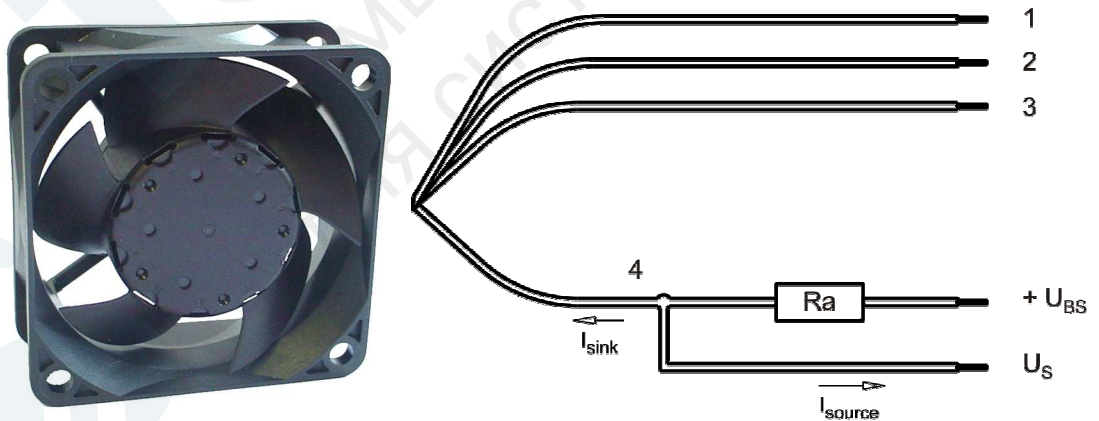
2 Mechanics

2.1 General

| | | |
|---|---|--|
| Width | 60,0 mm | |
| Height | 60,0 mm | |
| Depth | 25,4 mm | |
| Mass | 0,070 kg | |
| Housing material | Plastic | |
| Impeller material | Plastic | |
| Max. torque when mounted across both mounting flanges | Wire outlet corner: 30 Ncm Remaining corners: 70 Ncm | |
| Screw size | ISO 4762 - M4 degreased, without an additional brace and without washer | |

2.2 Connections

| | | |
|-----------------------|-------------|--|
| Electrical connection | Wires | |
| Lead wire length | L = 310 mm | |
| Tolerance | +/- 10,0 mm | |



| Wire | Color | Operation | Wire size | Insulation diameter |
|------|--------|-----------|-----------|---------------------|
| 1 | red | + UB | AWG 24 | 1,10 mm |
| 2 | blue | - GND | AWG 24 | 1,10 mm |
| 3 | violet | PWM | AWG 24 | 1,10 mm |
| 4 | white | Tacho | AWG 24 | 1,1 mm |

The auxiliaries shown on the schematic diagram (which are required for the intended use) are not part of our delivery.

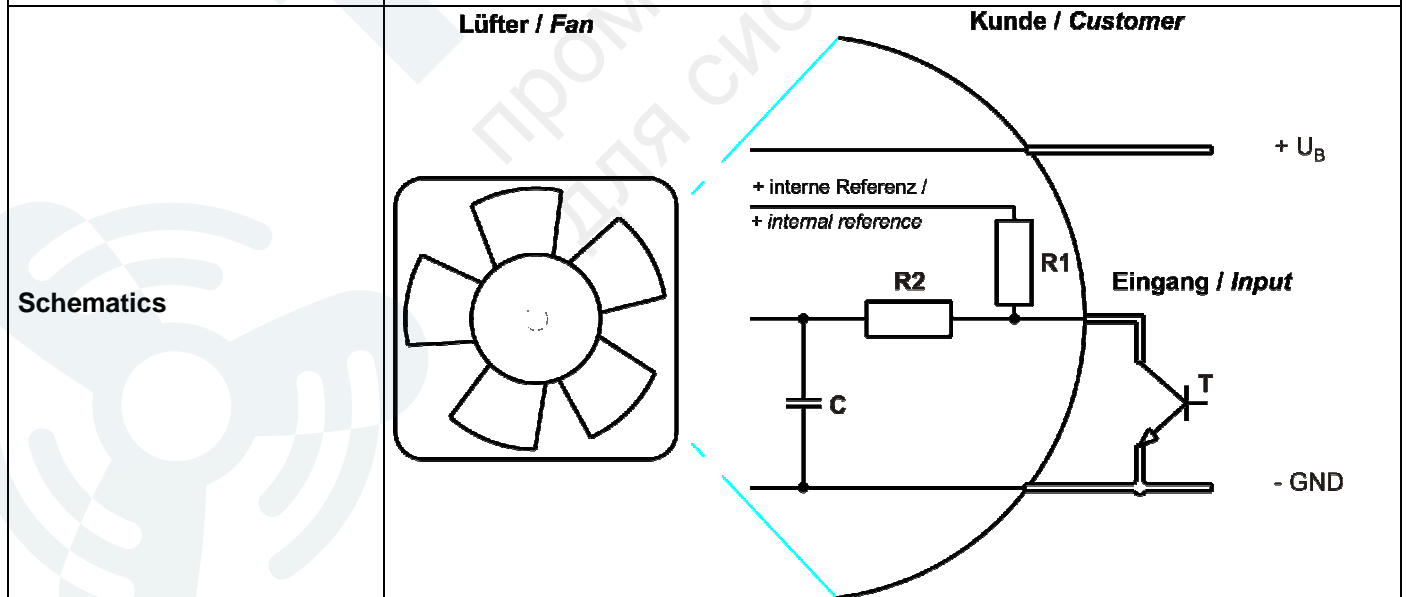
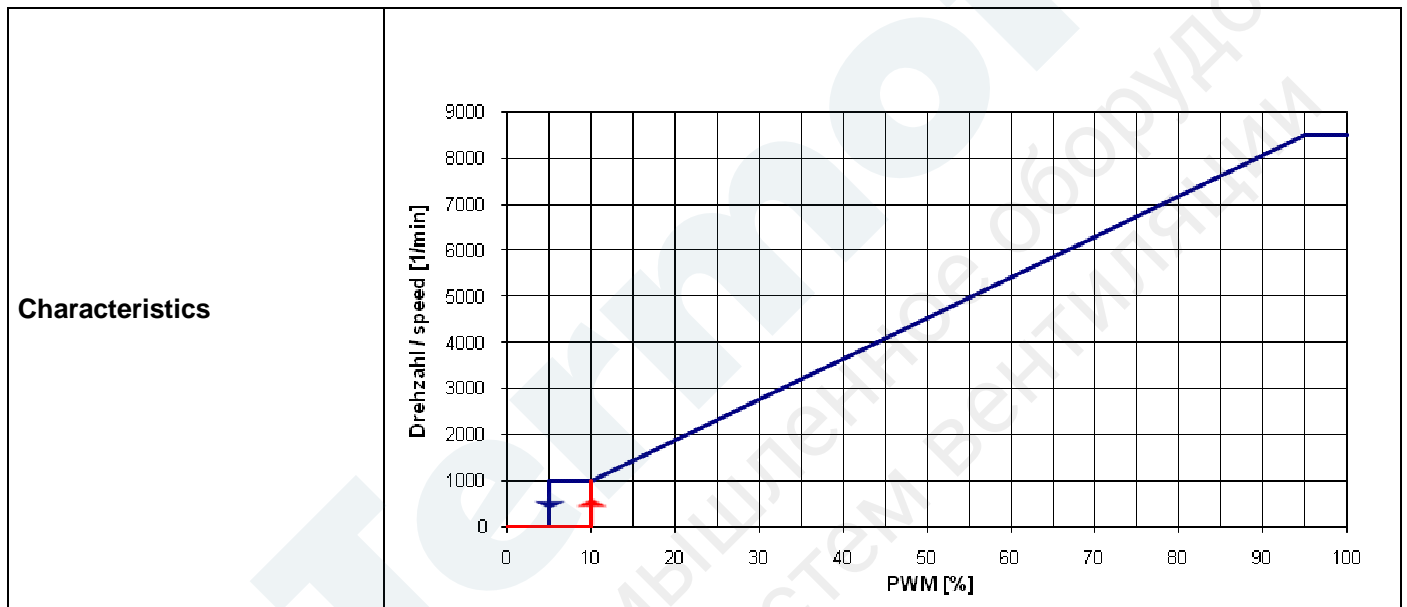
3 Operating Data

3.1 Electrical Interface - Input

| | |
|---------------|-----|
| Control input | PWM |
|---------------|-----|

Features

| | | |
|-----------------|----------------|----------------|
| Input type | Open collector | |
| PWM - Frequency | | 1 kHz - 30 kHz |



3.2 Electrical Operating Data

Measurement conditions: Normal air density = 1,2 kg/m³; Temperature 23°C +/- 3°C; Motor axis horizontal; warm-up time before measuring 5 minutes (unless otherwise specified). In the intake and outlet area should not be any solid obstruction within 0,5 m.

$\Delta p = 0$: corresp. to free air flow (see chapter aerodynamics)
I: corresp. to arithm. mean current value

| Name | Condition |
|----------|---------------|
| PWM 0001 | PWM: >= 95 %; |

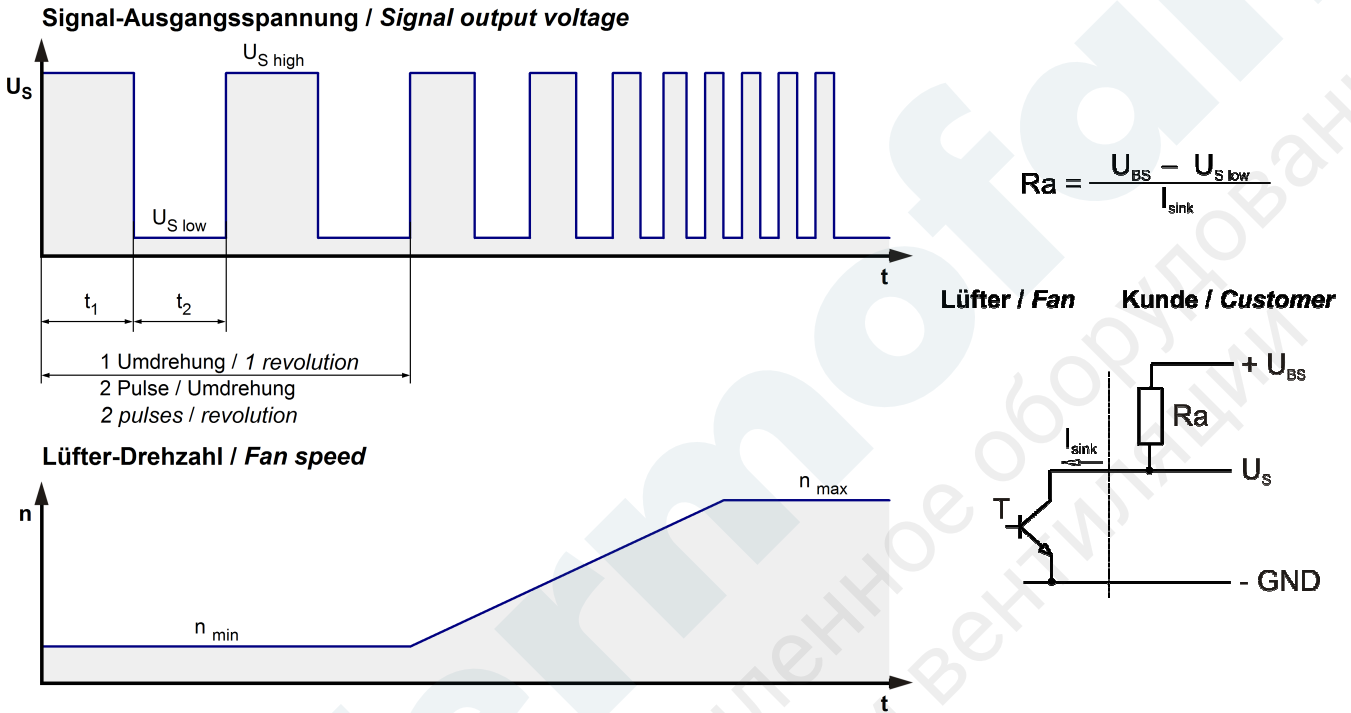
Startup peakpulse current: $I_{pmax} = 350\text{mA}$

Startup peakpulse duration: $t_p = 6 \times 1\text{ms}$

| Features | Condition | Symbol | Values | | |
|------------------------------|----------------|--------|-------------|-------------|-------------|
| Voltage range | | U | 40 V | | 60 V |
| Nominal voltage | | U_N | | 48 V | |
| Power consumption | $\Delta p = 0$ | P | 2,5 W | 3,2 W | 3,5 W |
| Tolerance | PWM 0010 | | +/- 17,5 % | +/- 17,5 % | +/- 17,5 % |
| Current consumption | $\Delta p = 0$ | I | 62 mA | 66 mA | 58 mA |
| Tolerance | PWM 0010 | | +/- 17,5 % | +/- 17,5 % | +/- 17,5 % |
| Speed | $\Delta p = 0$ | n | 7.700 1/min | 8.500 1/min | 8.500 1/min |
| Tolerance | PWM 0010 | | **) | **) | **) |
| Starting current consumption | | | | <= 315 mA | |

3.3 Electrical Interface - Output

| | |
|------------|---------------------|
| Tacho type | /2 (open collector) |
|------------|---------------------|

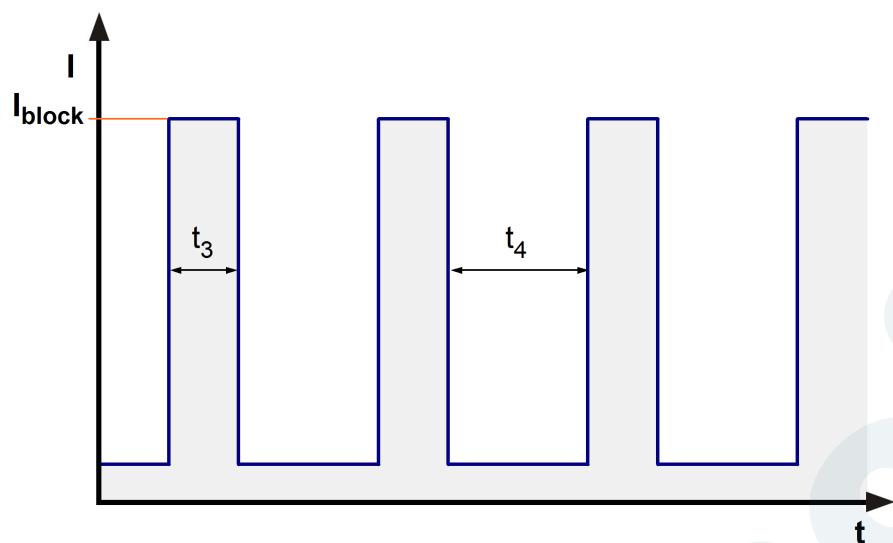


| Features | Note | Values |
|---------------------------|---|-------------------------------|
| Tacho operating voltage | U_{BS} | $\leq 60\text{ V}$ |
| Tacho signal Low | $U_{S\ low}$ | $\leq 0,4\text{ V}$ |
| Tacho signal High | $U_{S\ high}$ | $\leq 60\text{ V}$ |
| Maximum sink current | I_{sink} | 4 mA |
| External resistor | External resistor Ra from UBS to US required. All voltages measured to GND. | |
| Tacho frequency | $(2 \times n) / 60$ | |
| Tacho isolated from motor | No | |
| Slew rate | | $\Rightarrow 0,5\text{ V/us}$ |

n = revolutions per minute (1/min)

3.4 Electrical Features

| | | |
|--------------------------------|-----------------------------------|--|
| Electronic function | Speed-Controlled | |
| Reversed polarity protection | Rectifying diode | |
| Max. residual current at U_N | $I_F \leq 900\text{ uA}$ | |
| Locked rotor protection | Auto restart | |
| Locked rotor current at U_N | I_{block} approx. 315 mA | |
| Clock signal at locked rotor | t_3 / t_4 typical: 0,3 s / 10 s | |

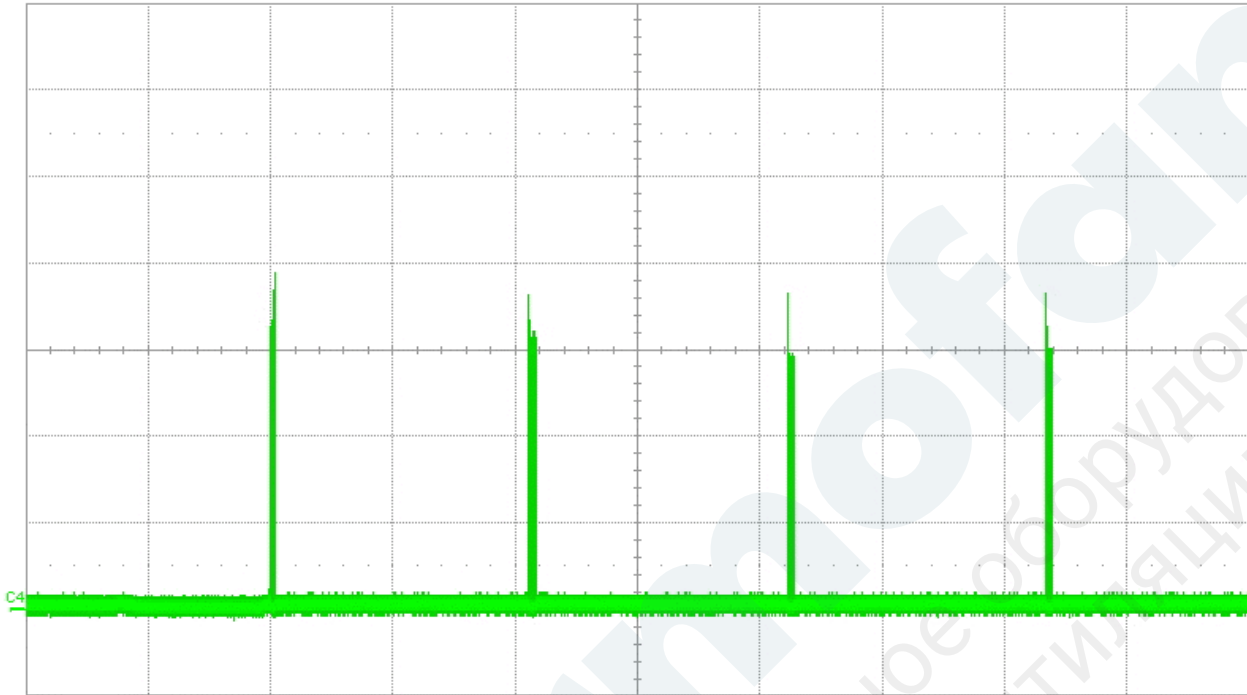


The fan has a special blocking cycle. The behavior of this cycle differs marginally between a blocked rotor when the fan gets started and a blocked rotor during the running operation of the fan. The following figures describe this characteristic.

1. Blocked rotor at the start of the fan



Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe

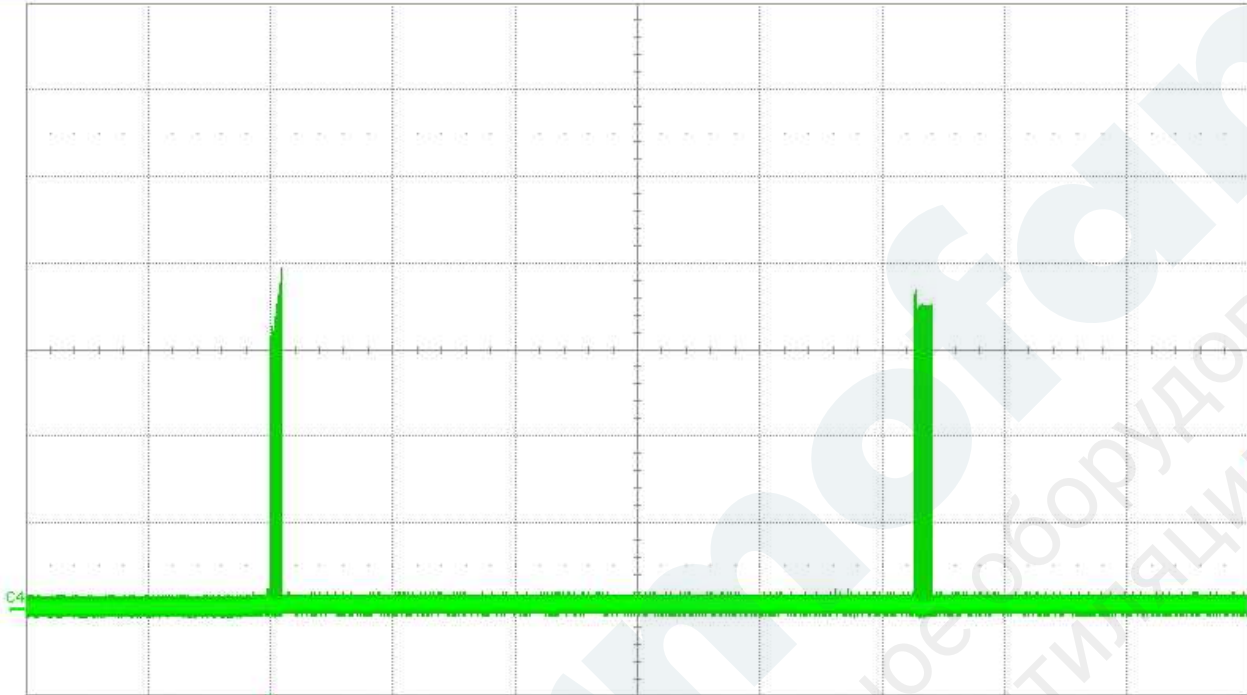


| | | | | | | |
|----------------|-------------|-------------|-------------|------------|-------------|-------------|
| Measure | P1:freq(C1) | P2:duty(C1) | P3:mean(C4) | P4:max(C3) | P5:freq(C1) | P6:duty(C1) |
| value | --- | 19.642 % | | | | |
| status | --- | --- | --- | --- | --- | --- |

| | | | | | |
|------------|--------|-----------|------------|---------|---------|
| C4 | BWL DC | Zeitbasis | -15.0 s | Trigger | C4 DC |
| 100 mA/div | | Roll | 5.00 s/div | Stopp | 180 mA |
| -301.0 mA | | 5.00 MS | 100 kS/s | Edge | Negativ |

TELEDYNE LECROY 4/11/2017 2:08:29 PM

Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



Measure
value
status

P1:freq(C1)

P2:duty(C1)

P3:mean(C4)

P4:max(C3)

P5:freq(C1)

P6:duty(C1)

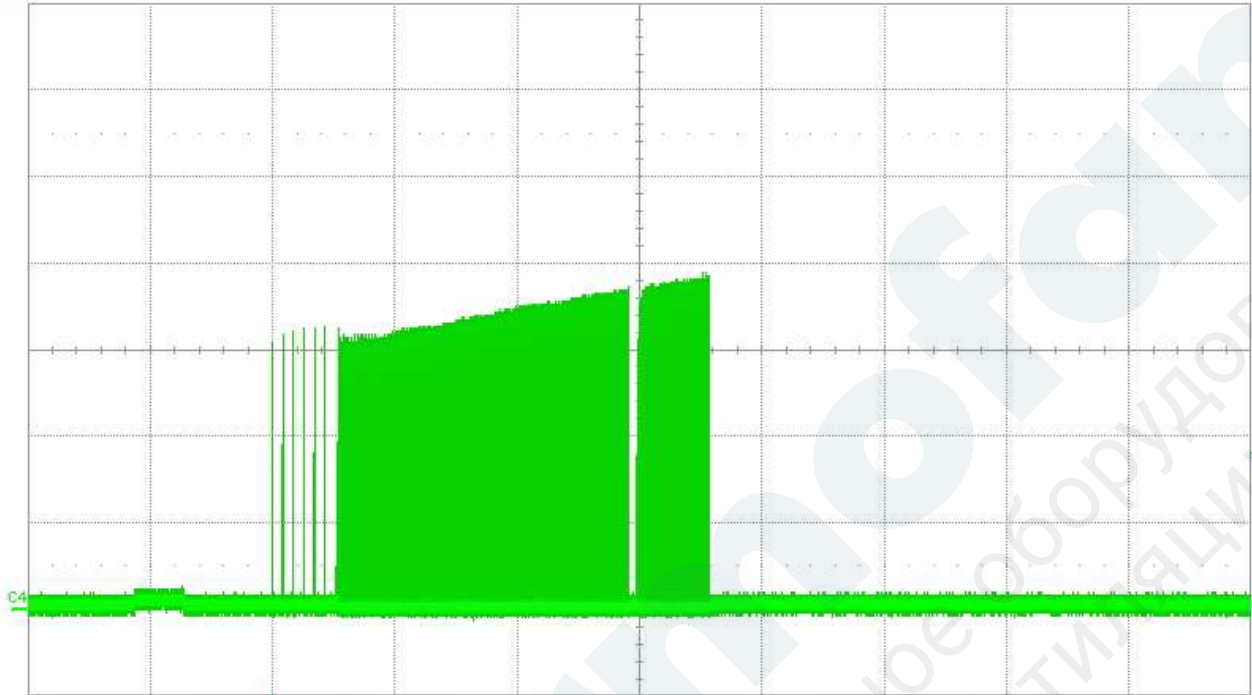
C4 BwL DC
100 mA/div
-301.0 mA

TELEDYNE LECROY

Zeitbasis -6.00 s Trigger C4 DC
Roll 2.00 s/div Stopp 180 mA
5.00 MS 250 kS/s Edge Negativ

4/11/2017 2:09:01 PM

Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



| Measure | P1:freq(C1) | P2:duty(C1) | P3:mean(C4) | P4:max(C3) | P5:freq(C1) | P6:duty(C1) |
|---------|-------------|-------------|-------------|------------|-------------|-------------|
| value | --- | 2.453 % | | | | |
| status | ⚠ | ⚠ | | | | |

| | |
|------------|--------|
| C4 | BwL DC |
| 100 mA/div | |
| -301.0 mA | |

TELEDYNE LECROY

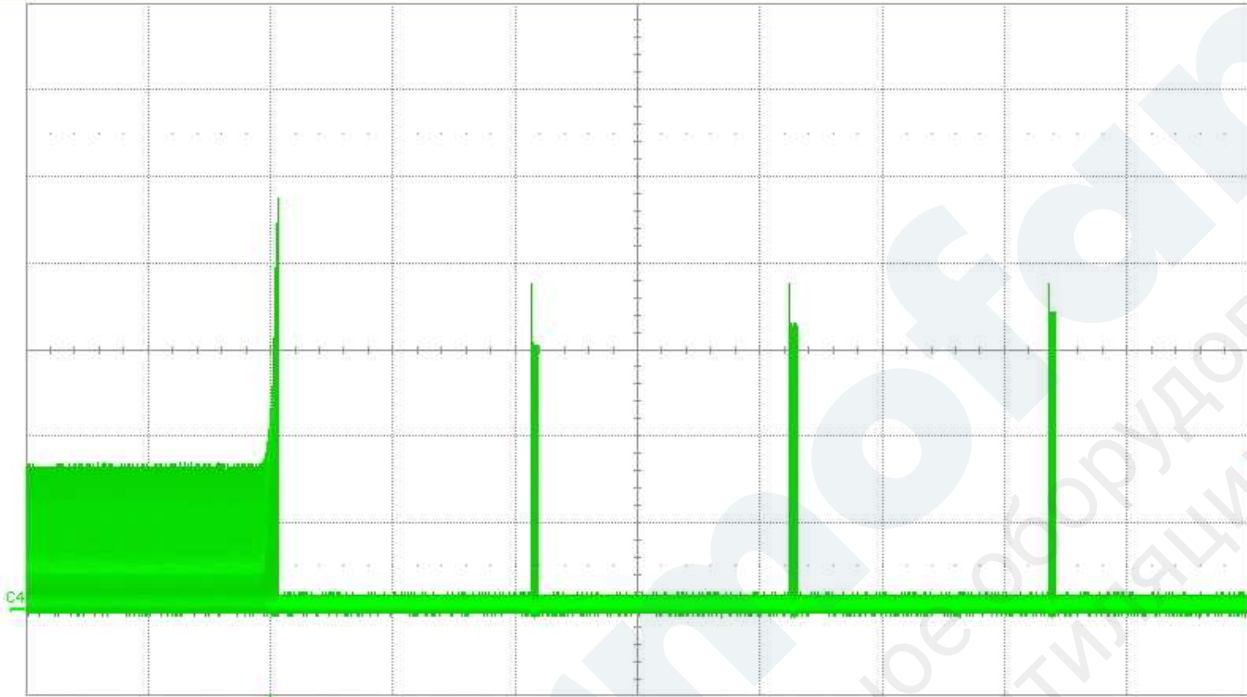
| | | | |
|-----------|-------------|---------|---------|
| Zeitbasis | -150 ms | Trigger | C4 DC |
| | 50.0 ms/div | Stopp | 180 mA |
| | 5.00 MS | Edge | Negativ |

4/11/2017 2:09:49 PM

2. Blocked rotor after the normal operation of the fan



Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



Measure
value
status

P1:freq(C1)

P2:duty(C1)

P3:mean(C4)

P4:max(C3)

P5:freq(C1)

P6:duty(C1)

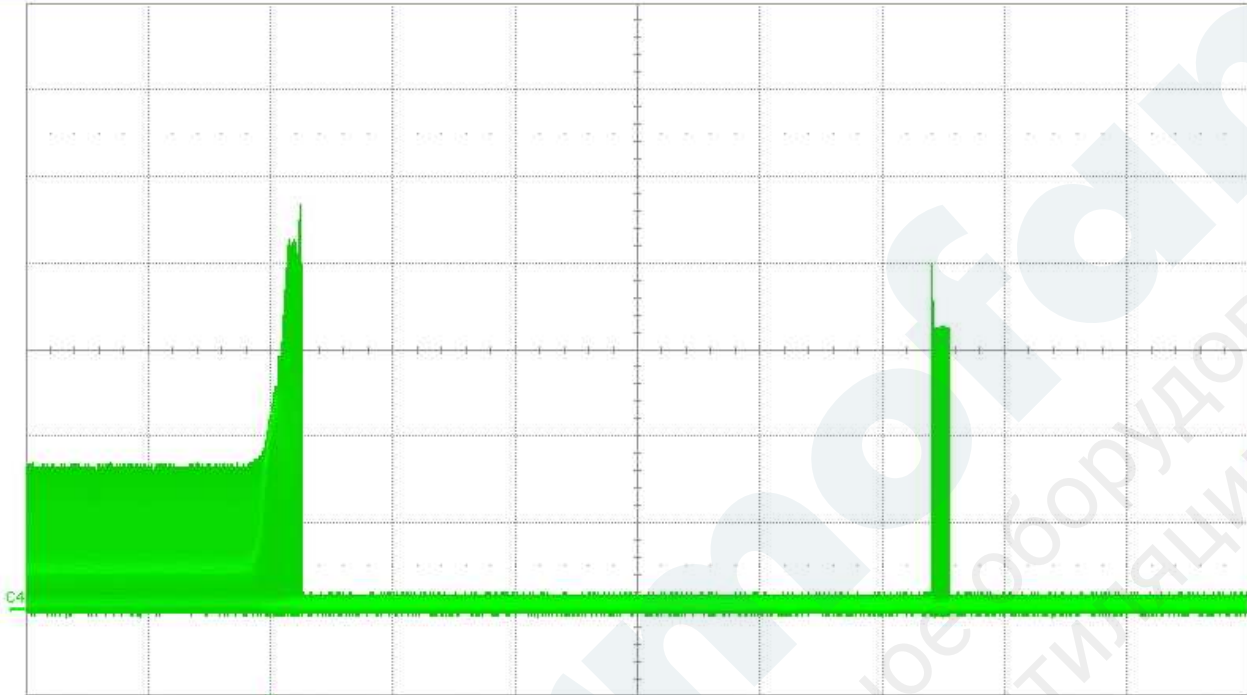
C4 BwL DC
100 mA/div
-301.0 mA

TELEDYNE LECROY

Zeitbasis -15.0 s Trigger C4 DC
Roll 5.00 s/div Stopp 180 mA
5.00 MS 100 kS/s Edge Negativ

4/11/2017 2:04:18 PM

Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



Measure
value
status

P1:freq(C1)

P2:duty(C1)

P3:mean(C4)

P4:max(C3)

P5:freq(C1)

P6:duty(C1)

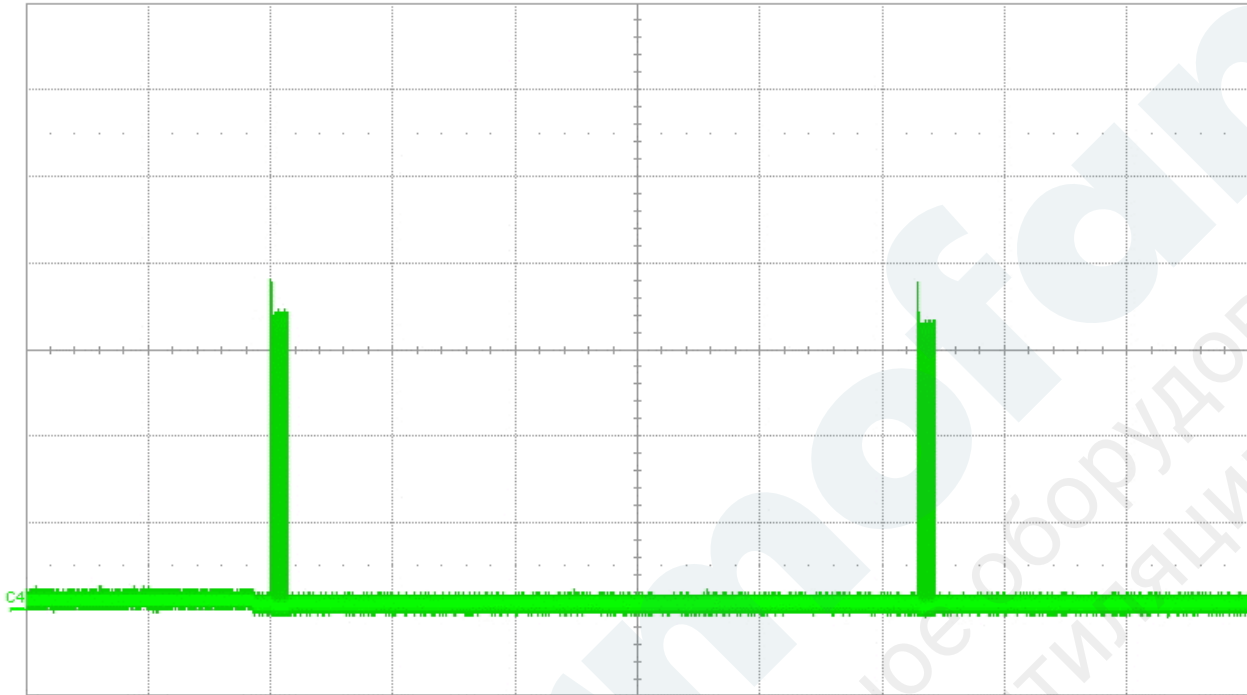
C4 BwL DC
100 mA/div
-301.0 mA

TELEDYNE LECROY

Zeitbasis -6.00 s Trigger C4 DC
Roll 2.00 s/div Stopp 180 mA
5.00 MS 250 kS/s Edge Negativ

4/11/2017 2:05:01 PM

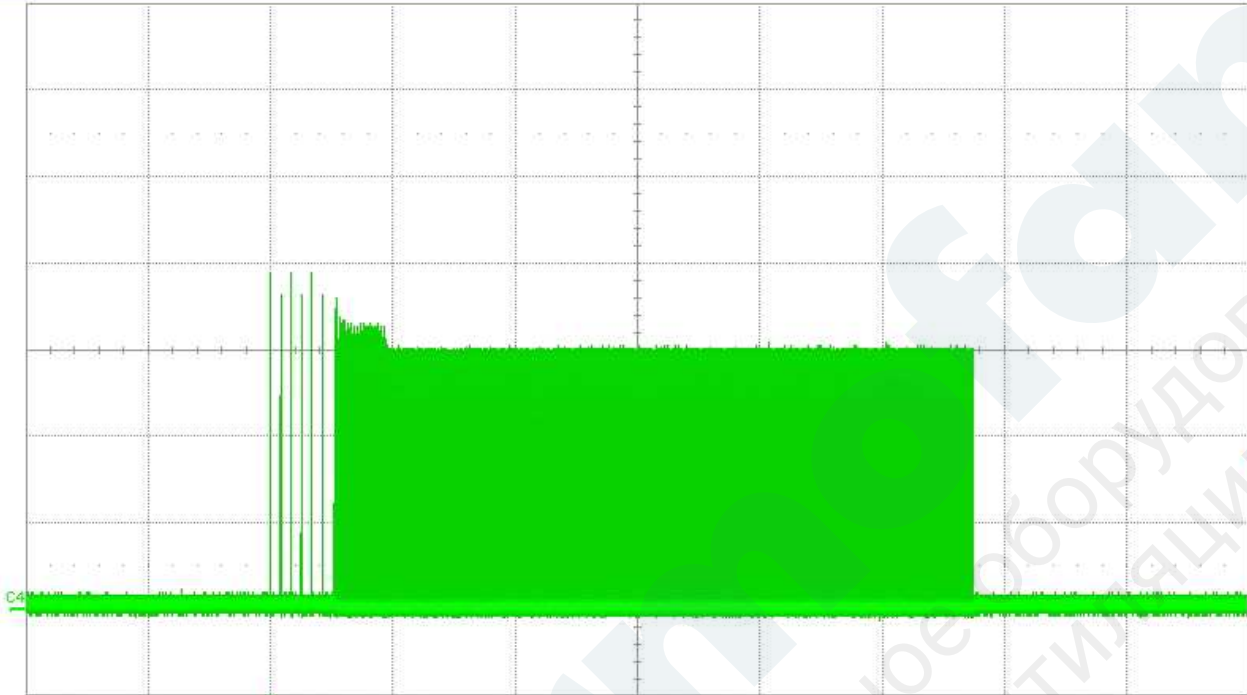
Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



| Measure | P1:freq(C1) | P2:duty(C1) | P3:mean(C4) | P4:max(C3) | P5:freq(C1) | P6:duty(C1) |
|---------|-------------|-------------|-------------|------------|-------------|-------------|
| value | --- | 82.924 % | | | | |
| status | ▲ | ⌚ | | | | |

| | | | | | |
|----------------------|--------|-----------|------------|---------|---------|
| C4 | BWL DC | Zeitbasis | -6.00 s | Trigger | C4 DC |
| 100 mA/div | | Roll | 2.00 s/div | Stopp | 180 mA |
| -301.0 mA | | 5.00 MS | 250 kS/s | Edge | Negativ |
| TELEDYNE LECROY | | | | | |
| 4/11/2017 2:05:45 PM | | | | | |

Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



Measure
value
status

P1:freq(C1)

P2:duty(C1)
39.345 %
.r.

P3:mean(C4)

P4:max(C3)

P5:freq(C1)

P6:duty(C1)

C4 BwL DC
100 mA/div
-301.0 mA

TELEDYNE LECROY

| | | | |
|----------------------|-------------|---------|--------------|
| Zeitbasis | -150 ms | Trigger | C4 DC |
| | 50.0 ms/div | Stopp | 180 mA |
| | 5.00 MS | 10 MS/s | Edge Negativ |
| 4/11/2017 2:06:23 PM | | | |

3.5 Aerodynamics

Measurement conditions:

Measured with a double chamber intake rig acc. to DIN EN ISO 5801.

Normal air density = 1,2 kg/m³; Temperature 23°C +/- 3°C;

In the intake and outlet area should not be any solid obstruction within 0,5 m. Motor shaft horizontal.

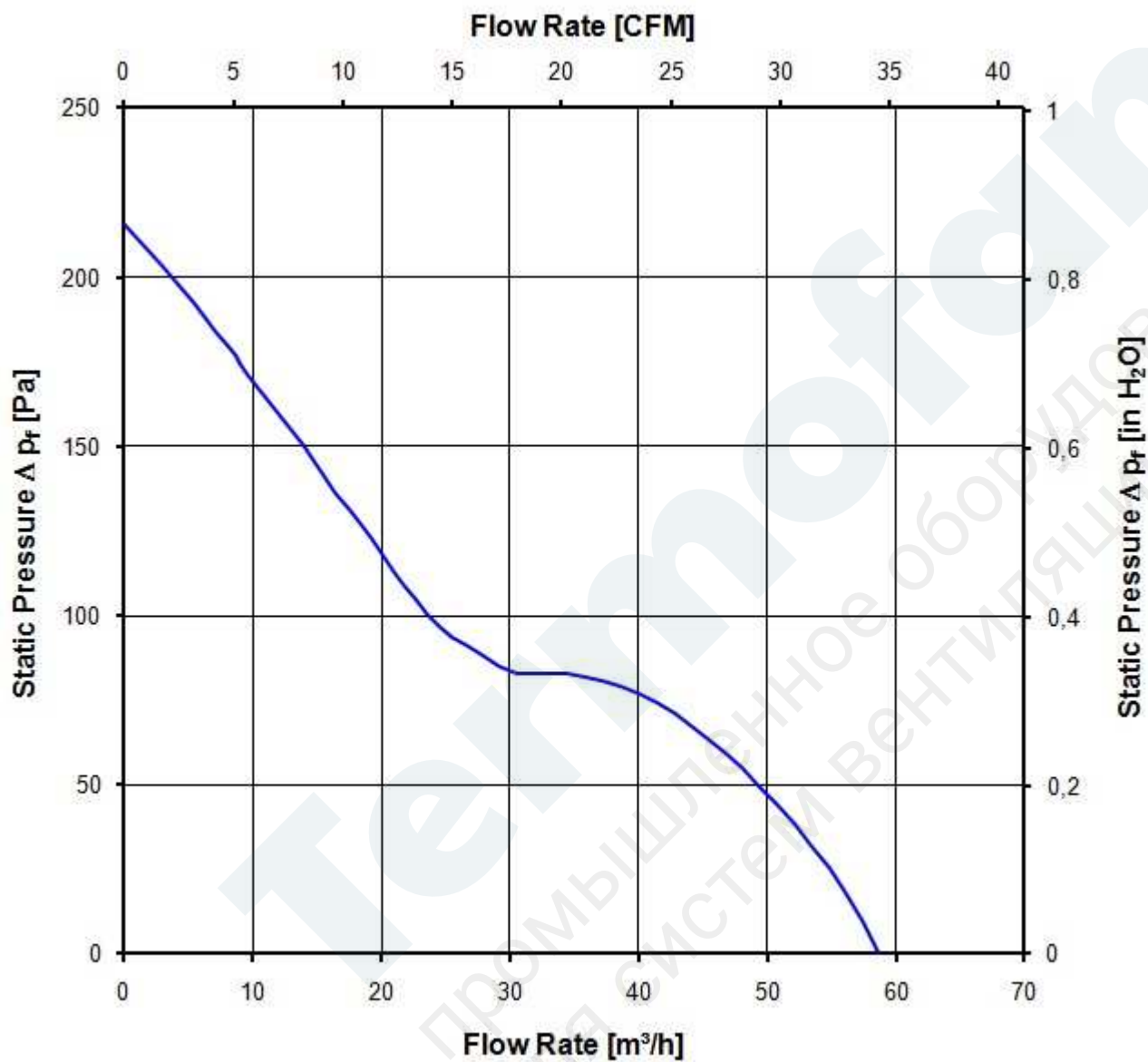
The information is only valid under the specified test conditions and may be changed by the installation conditions. If there are deviations from the standard test conditions, the characteristic values must be checked under the installed conditions.

a.) Operation condition:

| | | | |
|------------------------------|--------------|--|--|
| 8.500 1/min at free air flow | PWM >= 95 %; | | |
|------------------------------|--------------|--|--|

| | | |
|---|------------------------|--|
| Max. free-air flow ($\Delta p = 0 / \dot{V} = \max.$) | 58,0 m ³ /h | |
| Max. static pressure ($\Delta p = \max. / \dot{V} = 0$) | 215 Pa | |





3.6 Sound Data

Measurement conditions: Sound pressure level: 1 meter distance between microphone and the air intake.
 Sound power level: Acc. to DIN 45635 part 38 (ISO 10302)
 Measured in a semianchoic chamber with a background noise level of $L_p(A) < 5 \text{ dB(A)}$
 For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

| | | | |
|------------------------------|--------------------|--|--|
| 8.500 1/min at free air flow | PWM $\geq 95 \%$; | | |
|------------------------------|--------------------|--|--|

| | | |
|---|--------------------------------|--|
| Optimal operating point | 40,0 m ³ /h @ 77 Pa | |
| Sound power level at the optimal operating point | 6,1 bel(A) | |
| Sound pressure level at free air flow, measured in rubber bands | 44,0 dB(A) | |

4 Environment

4.1 General

| | | |
|--|--------|--|
| Min. permitted ambient temperature TU min. | -40 °C | |
| Max. permitted ambient temperature TU max. | 70 °C | |
| Min. permitted storage temperature TL min. | -40 °C | |
| Max. permitted storage temperature TL max. | 80 °C | |

4.2 Climatic Requirements

| | | |
|-----------------------|---|--|
| Humidity requirements | humid temperature, cyclic; according to DIN EN 60068-2-38, 10 cycle and condensation water check; according to DIN EN ISO 6270-2, 14 days | |
| Water exposure | Immersion test IPX8; according to DIN EN 60529 VDE 0470, not certified | |
| Dust requirements | Dust check IP6X; according to DIN EN 60529 VDE 0470, not certified | |
| Salt fog requirements | Salt fog, constant, (Bellcore II); according to DIN EN 60068-2-22, 30 days, operation at nominal speed | |

Permitted application area:

The product is for the use in open and unsheltered areas. Direct exposure to water as well as saline ambient conditions are allowed provided that this does not prevent the normal operation.

Pollution degree 4 (according DIN EN 60664-1)

It occurs permanent conductivity caused by conductive dust, rain or moisture.

Please require severity levels and specification parameters from the responsible development departments.

5 Safety

5.1 Electrical Safety

| | | |
|---|--|--|
| Dielectric strength DIN EN 60950 (VDE 0805) and DIN EN 60335 (VDE 0700) A.) Type test Measuring conditions: After 48h of storage at 95% R.H. and 25°C. No arcing or breakdown is allowed! All connections together to ground. B.) Routine test Measuring conditions: At indoor climate. No arcing or breakdown is allowed! All connections together to ground. | 500 VAC / 1 Min. 850 VDC / 1 Sec. | |
| Isolation resistance Measuring conditions: After 48h of storage at 95% R.H. and 25°C measured with U=500 VDC for 1 min. | RI > 10 MOhm | |
| Clearance / creepage distance | 1,0 mm / 1,5 mm | |
| Protection class | III | |

5.2 Approval Tests

| | | |
|-----|---|---|
| CE | EC Declaration of Conformity | Yes |
| EAC | Eurasian Conformity | Yes |
| UL | Underwriters Laboratories | Yes / UL507, Electric Fans |
| VDE | Association for Electrical, Electronic and Information Technologies | Yes / Approval acc. to EN 60950 (VDE 0805) - Information technology equipment |
| CSA | Canadian Standards Association | Yes / C22.2 No. 113 Fans and Ventilators |
| CCC | China Compulsory Certification | Yes / GB 12350 Safety Requirements for small Power Motors |

6 Reliability

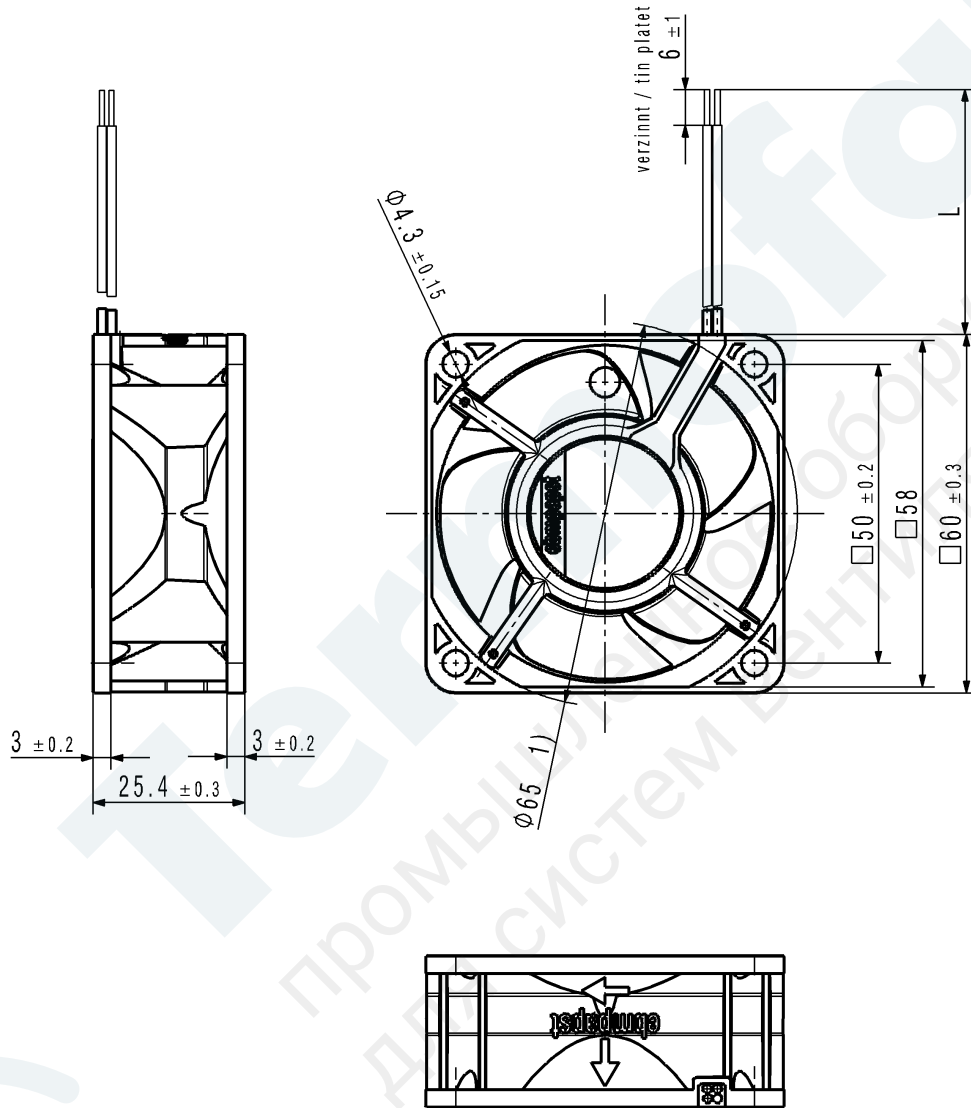
6.1 General

| | | |
|--|-----------|--|
| Life expectancy L10 at TU = 40 °C | 75.000 h | |
| Life expectancy L10 at TU max. | 37.500 h | |
| Life expectancy L10 acc. to IPC 9591 at TU = 40 °C | 127.500 h | |

Copying of this document, and giving it others and the use or communication of the contents thereof, are forbidden without express authority. Offenders are liable to the payment of damages. All rights are reserved in the event of the grant of a patent or the registration of a utility model or design.

Schutzmerk nach DIN ISO 16016 beachten!
Refer to protection notice DIN ISO 16016!

Anzahl und Länge der Litzen siehe BV - Blatt 1
length and number of wires see design specification page 1



1) Maße fuer Montagewand / measures for mounting plate
Axialspiel bei Kugellagerung (K): 0 (mit Federausgleich) /
by ballbearing (K): 0 (by pre-loaded spring)

| | | | | | | | | | | | |
|--|--|-----------------------------------|--|---|--|----------------------------------|--|-----------------------------------|--|---|--|
| SAP-Status/State | | Aend.-Nr./ Change-No. | | CATIA-System-Version/ CATIA-System-Version | | CAD-Umgebung/ CAD-Environment | | Werkstoff / Material: | | Volumen / Volume (mm ³): | |
| | | 9292308001 CPR000 | | 3D-Referenzmodell / 3D-Referencemodel | | Artikel / Title: | | Zchg.-Nr. / Drawing No: | | Gewicht / Mass (g): | |
| Tolerierung / Tolerances: | | Datum | | Name | | Zchg.-Nr. / Drawing No: | | Ers.f.Zchg. / Replaces: | | Format / Size: | |
| Allgemeintoleranzen / Gen. Tolerances: | | Bearb./ Drawn | | Gepr./ Checked | | Freig./ Released | | Dokumenttyp / Type of Document | | Teildokument (Blatt/Page) | |
| | | | | Index / Index | | Format / Size: | | Massstab/Scale | | | |
| | | ebm-papst St.Georgen GmbH & Co KG | | | | | | | | | |